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An Analysis of Behavioral Approaches to Obesity/Weight Reduction

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AN ANALYSIS OF BEHAVIORAL APPROACHES
TO OBESITY/WEIGHT REDUCTION

by

Charlene Marie Curtis, M.A.

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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Behavioral technology has been applied to obesity/weight reduction. Three problems are identified: (1) the discrepancy between the measurement of, and the duration of time required for the acquisition and remediation of obesity and of weight; (2) the consensus of various reviewers that there are a number of methodological deficiencies in experimental studies termed behavioral approaches to obesity/weight reduction; (3) the absence of expressed methodological criteria stated by reviewers for their recommendations of certain procedures. There is compliance to some of the methodological criteria of the experimental analysis of behavior as adapted to obesity, and to weight in the studies recommended by the reviewers. Four factors regulate human body weight: genetic inheritance and metabolic processes; and eating and exercise behaviors which result from intellectual functioning, age, socio-economic status, environmental setting, and social control. These factors also affect therapeutic decisions. Opportunity for behavioral researchers to derive empirical data on eating and exercise behaviors of obese and overweight subjects exists among institutionalized populations. Until unequivocal data become available, the integrity of behavioral science is served by clinical therapists targeting client control over client environment. Obesity/weight reduction programs are intrinsic in the obligation the medical profession has to its consumers.

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Charlene Marie Curtis

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INTRODUCTION

The controversial nature of the subject of obesity is witnessed in this Public Health Service quote from Stuart and Davis (1972),

It cannot be overstressed that assigning a label of obese to any one person or group of persons should come only after a comprehensive assessment of all pertinent factors. The sex of the subject, age, body type, state of health, along with specific measurements such as skinfold thickness, must be considered in determining if a person is obese. Comparing any individual or group in terms of their heights and weights with a given set of averages or standards does not give adequate information on which to assess obesity since such comparisons imply weight not fatness. (their italics) (p. 8)

It appears that obesity and weight are not synonymous. If this is the case, and the experimental studies under investigation in this paper are termed behavioral approaches to obesity and weight reduction/control, it is imperative that a distinction between obesity and weight be made. The exacting reader will find that the properties ascribed to obesity and to weight are based on empirical data, and are necessary for the resolution of the confusion raised by equivocal outcomes in many of the experimental studies reviewed in Part II of this paper.

For the purposes herein, this paper loosely defines obesity as the condition of being fat, or having excess fatty tissue in the body. Although there are other techniques, the most frequent measurement of fatty tissue is made with external calipers. Seltzer and Mayer (1965) reported that triceps skinfold measurement is the easiest to measure, and is the most representative of total body fatness. Franzini and

Grimes (1976) stated the case for four distinct skinfold measurements. The four sites they recommend are the triceps, biceps, suprailiac, and subscapular. They describe these four sites as being more representative of the total distribution of body fat, and maintain that four measurements decrease the influence of a unitary error in measurement. Casual observation of the population at large reveals that some people appear to have a uniform distribution of fat in their bodies. Other people appear to have a larger proportion of fat from the waist up, in the stomach and/or abdomen, or from the waist down. The postulation for the four skinfold measurement sites, accurately gauging the amount of fatty tissue present there, seems more logical. It may even be determined that additional sites are necessary. The reader must be cautioned that while triceps skinfold data have provided normative standards for much of the population, validated data on the measurements from the other three sites for any population have not yet been established, according to Franzini and Grimes (1976). The perplexities surrounding the distinguishing property, or properties, which circumscribe the condition of obesity are not easily remediable. It is to be hoped that this deficit of scientific data will be corrected in the near future.

Weight is defined as an amount of heaviness, or the gravitational pull exerted on a body. Weight is measured by a set of scales; the balance beam or bar scales are considered by most to be more accurate than others. While obesity is relatively static, weight variance, as a result of fluid retention and excretion from diverse causes, is not uncommon. Two examples of causes for body fluid variability are

increased sodium or salt intake, and pathological edema. There are other factors involved in the weight of an individual which will not be addressed at this time. However, there are two identifying aspects that differentiate weight from obesity.

Different instruments are used to measure each variable, viz., external calipers for obesity vs. the balance beam/bar scale for weight; and a difference in the length of time required for acquisition and remediation of those measurements, viz., approximately one year for obesity vs. days or weeks for possible weight to change.

Having delineated obesity and weight for the purposes herein, at this time it is necessary to explicate the theoretical framework of this paper. Research strategies are directly related to the theoretical framework of the experimenter/clinician. The significance of an experimental study to the reader is contingent upon her/his theoretical framework, i.e., traditional experimentation or the experimental analysis of behavior. The function of this review is to scientifically and methodically examine behavioral approaches to obesity and weight reduction/control for empirical data. This purpose precludes the inclusion of traditional research strategies, and dictates adherence to and compliance with the accepted standards governing the experimental analysis of behavior.

Theoretical Position

In his textbook, Karen (1974) described the experimental analysis of behavior as the systematic and intensive study of a small number of subjects (from three to twelve) for one to two years. The subject is always compared to her/himself, but may be compared to the other sub-

jects when the experiment/observation is terminated. A subject's untreated and treated performances for the same dependent variable (reversal paradigm), or across independent variables (multiple baseline paradigm) are the acceptable procedures. Group comparisons involving group means are discouraged since between subject differences add variability to the data which may obscure the effects of the independent variable, i.e., the potential for significant differences in individual's backgrounds for exaggerating or concealing treatment effects is reduced or eliminated. The experimental analysis of behavior is the scientific foundation of empirical methodology. Therefore, the unilateral selection of the constraints in the experimental analysis of behavior is logical and legitimate, because the theoretical framework for this paper is empirical.

Based on the preceding descriptions of obesity and weight, it is possible to identify specific methodological procedures apropos to the experimental analysis of behavior for each targeted condition. It is apparent that the criterion for the number of subjects will be the same for both obesity and weight. The criterion for the duration of the experimental studies will be similar, however, the time required for a stable baseline as well as follow-up will be different for obesity and weight. Treatment outcome reporting will be raw data of the standard improvement criterion for either targeted condition, along with subject compliance and/or deviance. The standard improvement criterion will be different for either condition, as will the paradigm employed.

Methodological Criteria for the Behavioral Study of Obesity

Number of Subjects

There must be a small number of subjects under investigation by the experimenter(s). Although Karen (1974) set those numbers at three to twelve, single organism or case studies (or two less) are also acceptable. Thus, one to fourteen subjects are considered suitable for the experimental analysis of obesity (three to twelve plus or minus two).

Duration of Study

Since obesity is so resistant to alteration, experimental studies must continue for a minimum of one year, although two years is preferable. This time frame comprises baseline, treatment, and follow-up. Baseline should only require several measurements of the four skinfold sites with external calipers because of the stability of the fat tissue. Treatment should comprise the majority of the study, while follow-up should require only several measurements analogous to the baseline readings.

Treatment Outcome Reporting

Each subject should only be compared to her/himself during the course of the experimental study. Single organism or intra-subject measurements of the dependent variable in the form of individual raw data, viz., the four skinfold measurements is prescribed. Reports should include the history of individual drop outs, and relevant information as to compliance/adherence to the treatment program for obesity.

Standard Improvement Criterion (dependent variable)

If the subject of the study is obesity, the standard improvement criterion or dependent variable(s) should be skinfold measurements of the biceps, triceps, subscapular, and suprailiac regions by external calipers. The brand of calipers should be included as part of the data as per Franzini and Grimes (1976), with the same experimenter or her/his designee measuring the sites each time.

Procedures

Because obesity is so tenacious, the reversal paradigm is highly impractical, and the multiple baseline should be employed. Each of the four skinfold measurement sites should be used as a dependent variable for obesity studies. Measurements should not be made more frequently than once each month.

Methodological Criteria for the Behavioral Study of Weight

Number of Subjects

This rule remains the same for both obesity and weight reduction. There must be a small number (from one to fourteen) subjects under study.

Duration of Study

Weight is relatively unstable in many subjects, and should be studied for at least one year, again two years is optimal. Both baseline and follow-up should be maintained until variance in the weekly datum is minimal. Treatment time should vary according to the experimental technique used. The onus of sustaining uniform weighing conditions each week is on the experimenter, e.g., the same scale,

subject's clothing should be approximately the same weight and amount each time, the experimenter or her/his designee does the actual weighing and recording each time.

Treatment Outcome Reporting

Each subject should only be compared to her/himself during the course of the experimental study. Single organism or intra-subject measurements of the dependent variable in the form of individual raw data, viz., weekly recorded weight is prescribed. Reports should include the rationale for individuals dropping out, and relevant information as to compliance/adherence to the treatment program for each subject.

Standard Improvement Criterion (dependent variable)

If the area under investigation is weight, the standard improvement criterion or dependent variable can only be weight as taken and recorded weekly by the experimenter or her/his designee (under the same conditions each week).

Procedure

Because weight is so frequently variable in much of the population, the reversal paradigm should theoretically be employed. However, ethical considerations dictate cautious use of this procedure. A stable baseline must be established before any intervention procedure is employed. The weekly recorded weight should be continued during the reversal.

Having established some specifications for the distinction between obesity and weight, and the theoretical parameters with which

behavioral studies of obesity and weight are expected to comply, this paper will now attend to reviews of behavioral approaches to obesity and weight reduction/control in chronological sequence. The contents of these reviews will provide the reader a view of the diversity of experimental studies and treatment outcome reporting. A summary of what has been observed as deficits in selected reviews of experimental studies in the opinion of certain reviewers will be presented. The reader is thus afforded the opportunity to juxtapose the deliberations of those reviewers with those presented herein.

Survey of Reviewers

In a topical review, Abramson (1973) enumerated six problematic areas in the behavioral approaches to weight control: (1) a lack of controls for experimenter bias (expectancy), (2) the presentation of diverse improvement criteria, (3) the questionable use of statistical significance for treatment outcomes, (4) the frequent failure to report premature drop outs, (5) failure to provide adequate follow-ups, and (6) the absence of methods for predicting successful treatment. In spite of these methodological problems, Abramson viewed self-control procedures as reported by Stuart (1967), Wollersheim (1970), Harris (1969), Penick, et al. (1971), and Jeffrey and Christensen (1972) as justification for cautious optimism. Horan (1973) noted that "...Comprehensive behavioral approaches involving a multiplicity of methods such as those described by Stuart (1967) hold considerable promise. However, continued systematic evaluation is necessary in order to establish efficacy of individual treatment components."

(p. 13)

Bellack (1975) concluded that a combination of antecedent stimulus control procedures supplemented by contingency management techniques are the most effective mode of behavior therapy for weight reduction. Bellack cited experiments by Mann (1972) and Morganstern (1974) as providing impetus for further investigation of aversive conditioning procedures, while decrying self-control procedures as "...unlikely that individuals would be able to change long standing habits simply on the basis of having received new information..." (p. 77) He advocated the use of financial contingencies, self-reinforcement (contingent consequence), and covert conditioning procedures as components for a total behavioral package for weight reduction.

Leon (1976) evaluated psychological, diet, and medical treatments of weight reduction. She cited the equivocal results of the various behavioral approaches to weight reduction while noting "The relatively greater effectiveness of behavioral management and environmental control procedures in the maintenance of weight loss may be related to the specific emphasis on learning how to permanently change one's eating patterns. However, ...one is not justified in concluding that these specific techniques are the final answer to the treatment of obesity..." (p. 575) She recommends six areas for improved methodology in weight reduction research: (1) the criterion of change should be the maintenance of weight loss, (2) the sampling population should be more diverse, i.e., not just female college students, (3) attention-placebo groups should be part of the experimental design, (4) the same experimenter should serve as therapist for all experimental conditions

to control for experimenter bias, (5) attrition rates should be provided so that information can be developed regarding the type of program that is most effective and of interest to individual subjects, and (6) the particular obese population should be identified so that prediction of those subjects with a probability of success is possible. Leon does not refer her readers to any particular experimental studies.

In an updated review, Abramson (1977) recommends the use of complex self-control treatment for obesity. He notes that studies with one-year follow-up data are increasing and he anticipates the imminent possibility of five-year follow-up data through contract terms. He cites improvement in subject choice, viz., more representative clinical populations versus college students. Nevertheless, he cites five deficits in the methodology and reporting of behavioral research in weight control: (1) the need of controls for experimenter bias, (2) the need for a standardized improvement criterion, (3) the need to cease reporting statistical differences of treatment outcome (since it does not guarantee clinical utility), (4) the need to report drop outs, and (5) the need to devise methods for predicting success.

In an evaluation of long-term maintenance of weight control by behavioral treatments, Brightwell and Sloan (1977) stated that "It has been clearly established that behavioral treatments can lead to short term weight loss in most individuals who use them..." (p. 903), and "...Minimal evidence is available to support the position that weight loss continues even after all contact with the therapist has ceased." (pp. 903-904) They concluded with three characteristics of an ideal obesity treatment program: (1) the program would be effective for a

large portion of those who used it, (2) the program would result in a low drop out rate, (3) weight loss would be maintained. The criteria they used for evaluating the long-term effectiveness of behavioral treatments for overweight are: (a) data are derived from six or more cases, (b) data provide for comparison of studies, (c) duration of treatment is adequate to evaluate continued effectiveness, and (d) follow-up, after termination of contact with therapist, is long enough to evaluate weight loss maintenance.

Jeffery, Wing, and Stunkard (1978) concluded "...While a few individuals benefit greatly from behavioral programs, some are not affected at all..." (p. 196) Jeffery and Coates (1978) suggested six focal points for the remediation of alleged deficits surrounding the behavior therapy of obesity: (1) detailed data regarding the functional relationship between specific eating behaviors, the quantity and quality of foods consumed, and body weight is necessary, (2) determination of the most appropriate magnitude, mode, and schedule of motivation by positively identifying the reinforcement contingent behaviors as definitively producing weight loss is necessary, (3) the description of criterion performances in behavioral terms as opposed to weight is necessary, (4) individualized treatment programs by direct behavioral assessment instead of subjecting all clients to standardized treatment programs is necessary, (5) the use of single subject designs is necessary, (6) the development of a conceptual framework which incorporates all critical variables and useful techniques is necessary.

It is assumed that the recommendations of these authors were in response to deficits which they observed in the experimental studies

which they reviewed. If that assumption is valid, the perception is that there was a consensus from 1973 to 1978 that concerns about the purported behavioral approaches to obesity and weight reduction remain unmitigated. This situation is disillusioning to the behavioral researcher/clinician. Considerable doubt arises when the assessment criteria each author or set of authors employed in their evaluations, with the exception of Brightwell and Sloan (1977) is absent, and one must proceed with caution and vigilance. In order to shed more light on the situation, the reader is commended to the methodological issues postulated by an experienced researcher in the behavioral approach to obesity and weight reduction, D.B. Jeffrey (1974). Jeffrey raised six methodological issues in the research on obesity and weight reduction.

Attrition

Attrition rates are the first issue which was raised by Jeffrey. Attrition rates pose a problem for learning-based therapies as well as for traditional treatment approaches to weight reduction. He proposed "...since not reporting drop outs in a study can seriously affect the interpretation of results, it seems prudent to report at least the number of patients who do not complete treatment and whenever possible to include the dropouts in the analysis and interpretation of the results. It also seems advisable to investigate systematically what factors contribute to patients dropping out of treatment." (p. 623)

Jeffrey (1975) reiterated his position on the necessity of reporting drop outs in order to insure the internal validity of an experiment, i.e., subject mortality. In an experimental study by Hagen, Foreyt, and Durham (1976) the rationale for the concern over

attrition was unequivocally stated, "If attrition is too great, research results are seriously reduced in generalizability, and if attrition is differential across treatments, the effect of the treatment manipulation becomes impossible to interpret..." (p. 470) Wilson (1978), also supporting the reporting of drop outs, stated "...Interpretation of treatment findings must be guided by the fact that subjects who drop out of treatment are almost certainly treatment failures in obesity...treatment outcome studies." (p. 697) The experimental analysis of behavior specifically requires individual data on each subject as (s)he participates in the systematic and intensive study of explicit independent and dependent variables.

Standardized Improvement Criteria

The second methodological issue posited by Jeffrey (1974) is that of standardized improvement criteria. The article argued for Feinstein's (1959) weight reduction index: $\text{Weight Reduction Index} = \frac{(\text{Weight lost} / \text{Surplus weight}) \times (\text{Initial weight} / \text{Target weight}) \times 100}{1}$. In an earlier review, Abramson (1973) advocated some form of standardizing the present diversity of improvement criteria. He lamented that "The criteria used have included mean weight loss, percentage of Ss losing more than a predetermined amount, and average weekly weight loss..." (p. 553) Brightwell and Sloan (1977) postulated that "Subjective judgements about being overweight, a desire to lose weight, or a reference to 'ideal weight' do not provide a clear standard for determining obesity. To interpret results, a specific reference weight must be stated or at least identifiable. The term 'ideal weight' usually refers to the Metropolitan Life Insurance Company (1959)

data. Ranges as great as 40 lbs. are found in these tables. Without a specific reference weight, it is impossible to tell where a particular subject falls within that range..." (p. 899)

An interjection at this point is unavoidable. The above quotation from Brightwell and Sloan (1977) is one example of a common failure to discriminate obesity from weight, and weight from obesity. The intent of this section of the paper is to present a non-polemic and empirical basis for the review of the behavioral approaches to obesity and weight reduction/control. The position taken earlier, viz., obesity and weight differ in the time required to acquire and remediate the conditions, and the instruments used to measure the conditions, remains unchanged at this point. One sample of an experimental study which failed to discern this distinction is relatively recent. The standard improvement criterion for an experimental study by Stalonas, Johnson, and Christ (1978) was weight. Using inferential statistics of group means they found a nonsignificant tendency toward a main effect of exercise for Week 1 to the 1-year follow-up. It is possible that the use of skinfold measurements would have demonstrated a significant tendency toward a main effect of exercise.

At the risk of being redundant, this paper contends that human obesity is the condition of fatness or having excess fatty tissue, and not the amount of heaviness, which is weight. It is, therefore, appropriate to use skinfold measurements of the triceps, biceps, suprailiac, and subscapular sites which accurately gauge the amount of fatty tissue present at these locations if the dependent variable is obesity. These measurements are the most valid means of identifying long term loss of body fat as opposed to the more temporary loss of

body fluids and/or weight. However, if the dependent variable is weight, the measurements taken under relatively uniform conditions by the experimenter, or her/his designee, must be of each given individual subject for each week and/or month in the published reports of treatment outcome.

Follow-ups

The third methodological issue as expressed by Jeffrey (1974) is that of intermediate (six month) and long-term (one-year) follow-ups. This exhortation was reiterated by Brightwell and Sloan (1977). Wilson (1978) stated that "...The methodological strictures for the investigation and evaluation of treatment apply with equal force to maintenance or the follow-up phase of the study. All procedures followed should be explicitly described..." (p. 699) Conformance with the requirements of the experimental analysis of behavior demands a minimum duration of one-year for any experimental study. Any experimental study lasting for less than one-year (even with legitimate data) is of questionable utility for behavioral research and/or clinical implementation.

Cost Effectiveness

The fourth issue raised by Jeffrey (1974) is that of cost-effectiveness. He stated pragmatically, "...A treatment program which is effective but costs inordinate amounts of time and money has little relevance to clinical practice..." (p. 624) While this issue is valid, supportive evidence for the assumption that the behavioral treatment of weight reduction and obesity is empirically successful must be popularly recognized and accepted.

Research Strategies and Significance

Jeffrey's (1974) fifth methodological issue is the most complex and critical of all. As previously stated, research strategies are directly related to the theoretical framework of the experimenter, while its significance to the reader of the experimental study is contingent upon her/his theoretical framework, i.e., traditional experimentation or the experimental analysis of behavior. While some psychologists hope for a rapprochement between these two theoretical positions, there has been no universal or even widespread acceptance of such a reconciliation. Therefore, if an article is labeled as a behavioral approach, or implies that it is scientific in nature, it is the contention of this paper that it must adhere to the tenets of the experimental analysis of behavior, and withstand the scrutiny of empirical investigation.

Reporting of Individual Differences and Behavioral Failures

The sixth methodological issue raised by Jeffrey (1974) is the desirability of including individual differences and behavioral failures in reports of between groups/subjects experimental designs. This issue is irrelevant in the experimental analysis of behavior which strictly prohibits the use of group means for group comparisons, and demands individual data on each subject.

Overview

To recapitulate, this section began with a statement about the confusion over what constitutes obesity and weight. After delineating the two subjects, the theoretical position with which the behavioral

approaches to experimental studies is expected to conform was stated. The specific methodology inherent in the experimental analysis of behavior was then adapted to each of the subjects of obesity and weight. The perceptions of reviewers of experimental studies labeled as behavioral approaches to obesity and weight reduction/control were then cited. From 1973 to 1978 there appeared to be a consensus of opinion about deficits in this area of investigation. Methodological issues raised by an experienced experimenter in behavioral approaches to obesity and weight reduction were juxtaposed against the scientific methodology of the experimental analysis of behavior. Selected experimental studies termed behavioral approaches to obesity and weight reduction/control will next be evaluated. The methodological criteria for either dependent variable, identified by the study as weight or obesity, are the bases on which these studies will be assessed.

EVALUATION OF SELECTED EXPERIMENTAL STUDIES

The volume of literature which is labeled behavioral approaches to obesity and weight reduction is awesome. A recent unannotated bibliography by Loro (1978) contained a list of one hundred and eighty-two articles, books, and dissertations on behavioral approaches to weight reduction and obesity. Those articles contained supplemental reference sources, and additional literature is listed in Psychology Abstracts. The constraints of time and space alone preclude the assessment of each and every discrete experimental study. This paper must, therefore, unilaterally select a representative, though not exhaustive, number of experimental studies for evaluation.

Some of the reviewers cited in Part I recommended certain behavioral techniques as proposed and implemented in certain experimental studies. There may be an implicit accepted standard of excellence among the experimenters using behavioral approaches to obesity and weight reduction. If there is, it was absent from the published references perused for this paper. These reviewers presented no criteria on which they based their personal selections of methodology or intervention. It is appropriate for this paper to measure the recommendations of these reviewers against the methodological criteria advocated and subsumed by this paper. These studies will be evaluated for empirical data using the methodological criteria established in Part I of this paper.

Evaluation by the Criteria of the Experimental Analysis of Behavior

Abramson (1973): Commendations

The first experimental study this paper will evaluate is one on self-control. Stuart (1967) began the report with his description of the procedures that should be followed in self-control studies.

The first step in self-control is a precise analysis of the response to be controlled and its antecedent and consequent conditions. An analysis of overeating would naturally include a precise description of the topography of the response, the conditions under which it occurs, and its consequences. The second step is the identification of behavior which facilitates eating a proper amount of food (including the behavior which interferes with overeating). The third step is the identification of positive or negative reinforcers which control these behavior patterns. A reinforcer can be identified for every response, using Premack's principle ("Of any two responses, the more probable response will reinforce the less probable one;" Premack, 1965). Thus a reinforcer is always available for any desired response, independent of the topography of that response. The fourth step requires the application of the reinforcement to alter the probability of the preselected response (Homme, 1965). The outcome of selfcontrol can be termed "contingency management" and is designed to increase the frequency of desired overt or covert responses while decreasing the frequency of undesired responses. (p. 357)

He also stated that his program of self-control dealt with respondent as well as operant techniques. The program consisted of two sets of daily records kept by the subject: (1) food data sheets on which the time, nature, quantity, and circumstances of all food and drink consumption is specifically recorded, and (2) weight data sheets on which before and after breakfast, after lunch, and before bedtime weights are recorded. Additional information on high probability behaviors (with experimenter help when necessary), and weight-related fears is gathered from each subject. One aspect of the program is that the therapist is always accessible by telephone if a subject encounters

difficulty.

The first step of Stuart's behavioral curriculum was to instruct the subject to interrupt her/his meal (the behavioral chain of eating) so as to control eating behavior and overcome "...his compulsion". (p. 359) The subject is praised for success by the experimenter; the subject is asked to anticipate possible events that may be stressful, and to plan alternative responses to those stressful events rather than to respond by overeating. The second step of the behavioral curriculum was to instruct the subject to keep all food in the kitchen only, to keep only foods which require preparation in the house, and to prepare only a single serving each time. These instructions help the subject "...to become aware of his behavior." (p. 360) Step three of the behavioral curriculum was to instruct the subject to not pair eating with any other behavior. These three steps of Stuart's behavioral curriculum occurred within the first week of the intervention program. Stuart noted that "...weight loss may be greater during the first two weeks of treatment than it will be subsequently. This is probably related to the 'honeymoon effect' of treatment and to the fact that the patient has a greater volume of voluble fat which is convertible to energy during this time..." (pp. 360-361)

At this juncture it is necessary to question the variables which Stuart is using in his program. If he called his program the "Behavioral Control of Overeating" it would seem that the dependent variable would be eating. In the body of the report Stuart talked of "voluble fat" which would indicate that he intended to use skinfold measurement(s) as the dependent variable - not the measurement of

eating or weight. It would seem that this report would be more closely reflective of the previously established criteria for the methodology of the experimental analysis of behavior by measuring the quantity and quality of foods consumed by his subjects. Be that as it may, the fourth step was based on the hypothesis that obese individuals eat very rapidly: thus, the subject is instructed to take small bites and increase the time interval between bites. The fifth step in Stuart's behavioral curriculum was to instruct subjects in alternative responses to eating, i.e., to do something pleasurable rather than eat between meals. For subjects who have difficulties with between-meal eating he employed "covert sensitization". This intervention technique, as described by Stuart, consists of training the subject in relaxation, then in imagining (s)he is about to engage in a compulsive behavior, then in imagining an aversive event as a consequence of that compulsive behavior.

In Stuart's (1967) report on treatment outcomes, he stated that his subjects were referred to him by physicians who had judged the subjects to be obese. The data he presented include age (21-43 years), sex (all female), marital status, weight loss over twelve months, therapeutic sessions attended to the date of the writing of the article, along with a weight graph for each of the eight individual subjects. The study does comply with the number of subjects in the methodological criterion of the experimental analysis of behavior. The duration of the study was one year, however, there was no baseline data presented, and the twelve-month weights were only slightly leveled off (stable) for two subjects, Patients #2 and #7. Although it is apparent that the

dependent variable being measured was weight, the reversal paradigm was not employed. While the information contained in the Stuart (1967) study complied with several of the five criteria, it did not execute all of them.

Abramson (1973) sanctioned the Harris (1969) experimental study on weight control. Harris designated overeating as an addictive behavior, stating that "...the control of eating shares elements with the control of other undesirable appetitive behaviors but is further complicated by the facts that the stimuli for eating are ubiquitous and that some eating behaviors must be performed several times a day." (p. 264) The program design was reportedly a broad spectrum of behavioral techniques considered by the experimenter to be possible instruments of change. These techniques "...might assist an individual in attaining control of his own eating pattern he eventually wanted to maintain..." (p. 264)

Subjects in the Harris (1969) study were recruited by an advertisement in a university newspaper. These subjects comprised each of two treatment groups of three males and five females, and one control group with the same gender distribution. Subject variables indicating inclusion in the program were not stated, viz., height, weight, or age. The author implied that the subject population contained a number of college students, but subject status was not explicitly identified in the report. The criterion for improvement was not specified in the article, except that eating behavior was obliquely referred to as the dependent variable. In spite of this fact, weight was the dependent variable presented in this study. All subjects in the two treatment groups

received training in recording and eating behavior change similar to Stuart's (1967) program. Approximately two and one-half months later, these subjects were subdivided into a continuation subgroup and an aversive counterconditioning subgroup.

The treatment outcome report included original weight (no baseline weights were presented, nor was baseline mentioned), loss at two and one-half months after the inception of the program, and again at four months after the study began for each of the three males and four females in the control group, and each of the two subgroups. Comparisons of group means were also presented, however, the study basically complied with the methodological criterion for individual raw data in the reporting of treatment outcome. Seven subjects in each treatment group fulfilled the methodological criterion for the number of subjects. The standard improvement criterion was individual raw weight which is in accord with the theoretical position of this paper. There were two requirements of the experimental analysis of behavior not met in this study. The reversal paradigm was entirely absent when the dependent variable was weight. Because there was no baseline or follow-up data, the duration of the study is inadequate. It is interesting to note that Leon (1976) stated that "...no significant differences in weight loss as a function of the aversive counterconditioning procedure" (p. 558) are present in the Harris study. The conclusion, for the express purpose of precise empirical data which conclusively support a direct correlation between eating behavior(s) as modified by the experimental design and weight loss is partially fulfilled.

Abramson (1973) also commended the Wollersheim (1970) study as a successful model of the use of self-control procedures. This study is purported to be a scientifically controlled study of obesity using behavior modification techniques which were derived from learning principles. Manuals for the four therapists, and manuals for each subject in each of the four treatment conditions were written by Wollersheim. The three treatment groups were called: group social pressure along with positive expectations; nonspecific therapy to control for extraneous variables; focal therapy using techniques derived from learning principles similar to Stuart's (1967) program (subject self-recordings, deep relaxation exercises, and aversion techniques); along with a no treatment control group. Each of the four therapists treated subjects in each of the three treatment conditions to control for therapist variables in the experiment.

The subjects in Wollersheim's study were seventy-nine female university students who responded to notices in the university newspaper and bulletin boards. All but three subjects reportedly completed the treatment program. Subjects were considered over-weight if their actual weight was at least ten percent above their desirable weight according to the 1959 Metropolitan Life Insurance Company norms. The criterion of improvement was weight reduction. Baseline covered eighteen weeks. The subjects were randomly assigned to one of the four groups, thus each therapist treated five subjects in each treatment group for ten sessions lasting twelve weeks. Assessment instruments included height and weight taken on a physician's balance scale and several questionnaires which were administered a total of four

times (before and after baseline, at the end of the treatment condition, and at the eight-week follow-up).

The report of treatment outcome in this study consisted of comparisons of group means. No individual subject data were presented. Even if one accepts five subjects in each group as fulfilling the methodological criterion of the number of subjects in the study of weight, the subjects were not compared to themselves during the course of this study. The reversal paradigm, apropos to weight is also absent from this study. The follow-up was short by a minimum of fourteen weeks, and the identity of the individual responsible for the recording of weight is absent. Wollersheim (1977) published a sixteen-week follow-up of her 1970 study, still using comparisons of group means. Supportive evidence for an unequivocal relationship between the modification of eating behavior(s) and weight reduction is absent in this study.

Another self-control program mentioned positively by Abramson (1973) was an experimental study by Penick, Filion, Fox, and Stunkard (1971). These authors described the program as involving four general principles: (1) a description of all eating behavior by subject recordings, (2) the modification and control of the discriminative stimuli governing eating, e.g., location, table setting, no extraneous stimuli, (3) the development of techniques which control the act of eating, e.g., counting mouthfuls, manipulating utensils, and alternative physical activities, and (4) the prompt reinforcement of behaviors which delay or control eating. The report stated that "...short-term weight fluctuations, however, may result from physiologic factors such as fluid

shifts, and are therefore probably imperfectly related to the exercise of behavioral control of eating..." (p. 51) As a result, these experimenters considered the reinforcement of daily weighing to be counter-productive sometimes, although they did not specify the conditions under which it would be productive.

The subjects numbered thirty-two; twenty-four women and eight men. These subjects were randomly assigned to a behavior therapy group (N=15) or a control group (N=17). Other relevant data are stated as median percent overweight and median age. Treatment outcome results are presented as percent of groups losing specified amounts of weight, e.g., more than forty pounds, more than thirty pounds, etc. There are no baseline data; treatment lasted twelve weeks, and follow-up occurred at three and six months. While the number of subjects under investigation is acceptable for the methodological criterion in the study of weight, the duration of the study is not appropriate for the experimental analysis of behavior. Raw data in the form of weekly weight for each subject are completely absent from this study. The reversal paradigm was not employed. In short, this experimental study contained little empirical data which would provide scientific knowledge about weight or obesity.

Abramson (1973) also cited an experimental study by Jeffrey and Christensen (1972). The conflict in the dates of the article cited by Abramson and the 1975 date on the Jeffrey and Christensen article reviewed herein is due to the fact that "Portions of this study were presented at the annual convention of the Association for Advancement of Behavior Therapy, New York, October, 1972..." (p. 303) The authors

called the experiment a study in the management of obesity by (1) behavioral treatment consisting of monetary contingency contracting, environmental stimulus control, self-monitoring, energy expenditure, and group reinforcement procedures; and (2) will power, or the personality characteristics stressed by traditional researchers. A no-treatment control group was also part of the study.

The forty-three subjects comprised university graduate and undergraduate students, staff and faculty. There are thirty-five females and eight males ranging in age from eighteen to forty-nine. The reported weights of these subjects ranged from one hundred and ten pounds to two hundred and eighty-six pounds. These subjects were randomly assigned to one of the three groups so that the behavioral group consisted of nineteen subjects while the will power and control groups contained twelve subjects each. Six subjects in the behavioral group dropped out, with the remaining thirteen subjects completing the treatment and maintenance follow-up, according to the authors.

The experimental program consisted of two weeks of baseline (during which the subjects in the behavioral group were given instructions in the rationale of the treatment procedures and collected their own data). Actual treatment started the third week. The tenth week through the seventeenth week of the study, the experimenters reportedly began stimulus fading and reinforcement thinning. From the eighteenth week to the thirty-sixth week, a maintenance follow-up schedule was employed. The authors stated that each subject's total contact with the experimenter "...including group meetings, weigh-ins, phone calls, and maintenance follow-up appointments,..." (p. 306) was approximately

fourteen hours.

By deducting the drop outs, the number of subjects in this experimental study complies with the methodological criterion for the experimental analysis of behavior. The duration of the study from baseline to follow-up was thirty-six weeks which fails to meet the one-year time frame established in the methodological criterion in Part I. Treatment outcome reporting in this study was presented in comparisons of group means with no individual subject raw data. While the management of obesity was the purported goal of this study, the dependent variable employed was weight, although no individual subject weights appeared in the article, nor was the reversal paradigm used. This experimental study fails to meet the methodological criteria (with the one exception, the number of subjects) which would validate its acceptance in the domain of applied behavioral analysis. Leon (1976) concluded that the Jeffrey and Christensen (1975) study does not permit the assessment of "...the independent contribution of contingency contracting to the treatment results." (p. 562)

The preceding analyses of the experimental studies on which Abramson (1973) based his cautious optimism fail to present sufficient empirical data as advocated in this paper. Scientific evidence that conclusively identifies a correlation between the modification of eating behaviors and weight or obesity reduction remains to be established. Perhaps the experimental studies using aversive techniques recommended for further investigation by Bellack (1975) will provide definitive empirical data. Bellack (1975) stated that "...The review will encompass empirical studies and controlled single subjects

reports of outpatient applications of behavioral techniques with adults." (p. 73)

Bellack (1975): Commendations

The first of the two experimental studies cited by Bellack (1975) is authored by Mann (1972), and is entitled "The behavior-therapeutic use of contingency contracting to control an adult behavior problem: weight control". Mann gives his description of contingency contracting for this study as "...an explicit statement of contingencies. However, this contract incorporated a number of additional techniques that were considered necessary to accomplish effectively an applied behavior analysis, and which were relevant to the problems both of gaining systematic control of effective consequences and of maintaining reliable measurement." (p. 100) Mann proceeded to state that "...Weight was used as the dependent variable for two reasons: (1) It is a convenient and reliably measurable 'behavior', and (2) weight control is a socially important behavior problem." (p. 100) The purposes of this paper require the inclusion of these quotes so that the reader is able to identify Mann's theoretical position prior to the actual assessment of the study under the methodological criteria established in this paper.

Mann's (1972) subjects were seven females and one male, ranging in age from eighteen to thirty-three, who responded to an advertisement in some unidentified publication. Mann's subjects were required to obtain physician's statements with information regarding the medical safety of dieting for each individual, and any dietary prescriptions (the responsibility for adherence was assumed by the individual client - in

writing). Subjects were required to consent to a twenty-five pound weight loss, with the exception of one subject who agreed to lose sixteen pounds. Each subject was then proffered a contingency contract which was a legal document. The contingency contract specified four separate procedures: (1) each subject was required to relinquish a large number of esteemed possessions to the experimenter; (2) each subject's contract stated the conditions under which the esteemed articles could be redeemed or forfeited; (3) each subject was required to be weighed by the experimenter at regular intervals; and (4) each subject consented to the change of treatment conditions at the discretion of the experimenter, viz., the reversal paradigm - baseline, treatment, reversal, and then treatment conditions.

The contingencies were subdivided by time. Immediate contingencies were delivered for each two-pound weight loss or gain during the treatment condition. Two-week contingencies were delivered for success or failure to reach the targeted weight loss. The terminal contingency was the valuable(s) designated for redemption when the terminal weight had been reached. The contract also specified that all items were forfeited to the experimenter if any subject were to drop out of treatment prematurely, i.e., before the target weight had been achieved. Weights were recorded each Monday, Wednesday, and Friday throughout the experiment.

The treatment outcome reporting was stated as the average number of pounds lost or gained per week during each condition (baseline, treatment, reversal, and treatment) for each subject in Experiment I, and then for Experiment II. Experiment II comprised both treatment

conditions as in Experiment I, however, during the reversal condition, the experimenter delivered a valuable item to the subject if the two-pound weight loss occurred, but no article was lost if the subject gained weight, or failed to lose the two pounds. Mann stated that baseline was maintained until the weight stabilized. The mean weight change in pounds per week "...were calculated by averaging the rates of each subject..." (p. 104) according to the author.

Mann (1972) studied eight subjects, thus this experiment complies with the methodological criteria concerning the number of subjects. The duration of the study including baseline, treatment, reversal, and treatment, in Experiment I was one hundred and fifty days for Subjects #2, #3, and #4. Subjects #5 and #6 dropped out of the study. Subjects #7 and #8 were in the treatment condition for approximately two hundred days (this is strictly conjecture from the four-hundred day record of Subject #1 who was the only subject included in both Experiment I and Experiment II. While the baseline was appropriate, as Bellack (1975) noted, follow-up was absent in this study, therefore, its duration fell short of compliance with the methodological criterion for the experimental analysis of behavior as suggested in this paper. While Mann did present information on each individual subject, that appraisal was not given in terms of the standard improvement criterion or weight, but in average number of pounds lost or gained per week. Mann did use the reversal paradigm which is consonant with the methodological criterion for the experimental analysis of behavior re: weight.

Mann (1972) conceded several points at the conclusion of his

report. The first concession was that while the contingency contract was assumed to be the controlling factor in the subject's compliance with the assigned task, it was "...only to the extent that the subject did, in fact, surrender items of value." (p. 108), that the control was effective. Mann suggested that the variability in the effectiveness of the procedure may be accounted for by the subject's control of the assessed value of the surrendered items. The second concession was that the immediate reinforcement of the consumption of larger quantities of food may effectively compete against the delayed aversive effects of losing valuable articles which is an integral part of this procedure. The third concession was that "...Unsolicited anecdotal reports from some of the subjects indicated that they had used extreme measures at various times to lose weight rapidly and temporarily in order to avoid aversive consequences. These measures, reportedly, included taking laxatives, diuretics, and doing vigorous exercises just before being weighed. This problem may have occurred because the contract specified that the treatment contingencies be delivered contingent upon specified weight changes rather than the behaviors that can produce those changes. Weight, as a measure, is the result of various other behaviors. The contract neither specified, controlled, nor prescribed the manner in which the subject could arrive at changes in his weight. Therefore, any one of a number of behaviors could have resulted in a reduction of weight. These included appropriate dieting, an increase in exercise, or both, as well as extreme measures such as taking laxatives or diuretics which could avoid aversive consequences, at least on a temporary basis."

(pp. 108-109) Mann ended his report with a statement to the effect that he anticipated an increase in the use of contingency contracting in non-institutionalized settings with improved methods of the surveillance and monitoring of such behaviors as weight, smoking, drinking, and stealing.

In addition to Mann (1972), Bellack offered an experimental study by Morganstern (1974) as suggesting that "...aversive conditioning can be an effective tool for weight reduction. The primary consideration is that aversive stimuli should be applied contingently, while being experienced as aversive by the subject..." (p. 75) Morganstern (1974) used cigarette smoke as a noxious stimulus in the self-management of aversion therapy for compulsive eating using a single organism (subject) multiple baseline paradigm. He described his method as suggesting that "...the inhalation of cigarette smoke may be a potent aversive stimulus for the inexperienced smoker and may be used in a procedure that is simple, efficient and harmless." (p. 255) He enumerated the aversive consequences of cigarette smoking to the naïve (non-smoking) subject "...an immediate gag response, followed by sensations of dizziness, nausea, and even vomiting..." (p. 255)

The subject was a twenty-four year old female graduate student, who reported numerous experiences with diet and medically prescribed appetite suppressants. She had also been undergoing six years of psychotherapy with five different therapists, each working from a distinct theoretical framework. Three weeks of baseline data indicated an inordinate consumption of candy (200 pieces), cookies (by the dozens), doughnuts (by the dozens), ice cream and pizza each week. At the

first part of the fourth week of therapy, cigarette smoke was paired with candy, after the subject failed to "...consistently maintain a clear image,..." (p. 256) necessary for covert sensitization. This pairing of cigarette smoke with various kinds of candy was performed for the next six weeks, until the reported consumption of candy dropped to zero. From week eleven to week fifteen, the cigarette smoke was paired with cookies until the reported consumption of cookies was zero. From week fifteen to eighteen the cigarette smoke was paired with doughnuts until the reported consumption of doughnuts became zero. The report stated that these pairings were repeated ten times during treatment sessions, and that the subject was instructed to repeat the pairings twice each day in the absence of the therapist. In addition, the therapist later instructed the subject to use the concept of her control over the eating behaviors in order to exert control over other problem areas.

The Morganstern (1974) experimental study complies with all but one of the methodological criteria for the experimental analysis of behavior. The targeted behavior was compulsive eating in a single organism or subject design. Individual raw data of the treatment outcome included a multiple baseline paradigm graphing the three foods targeted as dependent variables during the baseline, as well as a graph of the subject's "Weight as a function of aversive contingency applications to candy, cookies, and doughnuts." (p. 258) The single criterion with which the study fails to comply is the duration of the study which was terminated at eighteen weeks. Two telephone calls at twenty-one and twenty-four weeks into the study "...revealed neither

the reappearance of compulsive eating nor any subsequent need for the treatment technique. Self-report data revealed no reduction in the subjective aversiveness of cigarette smoke during or after treatment..." (p. 258) Nevertheless, all of the criteria are not fulfilled because of the absence of follow-up data through fifty-two or more weeks.

Brightwell and Sloan (1977): Commendations

Brightwell and Sloan (1977) listed two case reports and fifteen group studies in their review of the literature for "Long-Term Results of Behavior Therapy for Obesity". These authors acknowledged resorting to the acceptance of a twenty-six week follow-up of treatment outcome reporting, because so few studies in the published literature met all their criteria. Their criteria included: (a) data are derived from six or more cases, (b) data provide for comparison of studies, (c) duration of treatment is adequate to evaluate continued effectiveness, and (d) follow-up after termination of contact with therapist, is long enough to evaluate weight loss maintenance. It must be noted that these authors accepted comparisons of group means for their evaluations, a computation which is anathema to the experimental analysis of behavior. Whenever a report contains only group means and their comparisons, the possibility exists that one or two subjects will have lost a large amount of weight while the remainder of the subjects lost none. The value of the intervention procedure being employed is thus open to suspicion when only group means are presented as the data. It is apparent that these reviewers are not measuring the experimental studies by the criteria recommended in this paper.

The first study Brightwell and Sloan (1977) described as having demonstrated some form of successful outcome was by Foreyt and Kennedy (1971). The technique used in this experimental study was aversive conditioning. Noxious odors were paired with the odor of "favorite foods" for each subject. Before the conditioning procedure was initiated, each subject established a hierarchy of "...desirable craved-for foods". The aversive conditioning program consisted of heating a favorite food in front of a subject. The experimenter then instructed the subject to smell the food; handle it; think about putting it to her lips, chewing it, etc. When the subject signalled compliance with the preceding instructions, she was directed to put her nose up to the oxygen mask and one of the six noxious odors (UCS) was blown up to her. The latency period for these two events was about one second according to the experimenters. Each subject determined which of the six noxious odors was suitable on each occasion. "...The CS-UCS pairings were repeated approximately 15 times throughout each session, depending on the individual S. An average of two different foods was run at each session. A food was run generally on consecutive sessions until the S reported that she was experiencing no desire for it and her food lists indicated that she was apparently not eating it." (p. 30)

The 30 minute conditioning sessions were performed approximately three times each week for the first four weeks, and twice each of the next five weeks. A random intermittent schedule (three to four of the fifteen pairings consisted of air as the UCS) was employed.

The subjects in this experimental study were three female undergraduate students, and three female members of a TOPS (Take-Off-Pounds-

Sensibly weight reduction club). The experimenters described the subjects as overweight, both by the subjects' physicians, and according to the New Weight Standards for men and women (Statistical Bulletin, November-December, 1959). The age range of the experimental subjects was eighteen years to fifty-three years. The initial weight range was one hundred and fifty-two pounds to two hundred and thirty-three pounds. All six subjects had lost weight after conditioning, however, after forty-eight weeks, only two subjects continued to lose weight while four subjects had regained varying amounts of weight.

This experimental study by Foreyt and Kennedy (1971) complies with the methodological criterion of the number of subjects. Forty-eight weeks is just short of the specified criterion for the duration of the study, however, no baseline data were mentioned or presented in the report, and subject weights did not stabilize during follow-up. Individual subject data were presented in the form of initial weights, the weight change in pounds after conditioning, and the weight change in pounds after forty-eight weeks. Raw data for each was not presented. The reversal paradigm was not employed as has been specified for the dependent variable of weight.

Foreyt and Kennedy (1971) stated candidly that "...the experimenter-patient relationship was vital in achieving the initial weight loss..." (p. 33), and that although subjects lose weight with almost any technique, no technique has been found which consistently demonstrates permanent weight loss. They recommended that aversive conditioning, such as theirs, be used along with other procedures in order to help patients maintain weight loss.

Brightwell and Sloan (1977) then cited an experimental study by Levitz and Stunkard (1974). The authors stated that "...Sixteen chapters of TOPS (Take-Off-Pounds-Sensibly), with a total of 234 members, received one of four treatments: behavior modification conducted by a professional therapist, behavior modification conducted by the TOPS leader, nutrition education conducted by the TOPS leader, and continuation of the usual TOPS program..." (p. 423) This study contains far too many subjects for the experimental analysis of behavior. The duration of the study is nine months which is inadequate for our criterion. No individual data were presented in the form of raw weights, nor was the reversal paradigm used.

The position of this paper is that the use of data on individual organisms is a prerequisite of the experimental analysis of behavior. The use of comparisons of group means as presented in a cluster of experimental studies cited by Brightwell and Sloan (1977) dictate their exclusion from the experimental analysis of behavior. This cluster includes a study by Mahoney (1974) which reported treatment outcome as comparisons of group means, and one-year follow-up results were expressed as percentages of subjects maintaining or improving program losses. Another study in this cluster is by Hanson, Borden, Hall, and Hall (1976) which also reported treatment outcomes as comparisons of group means, as were the results of their one-year follow-up. One study in the cluster, by McReynolds, Lutz, Paulsen, and Kohrs (1976), not only reported treatment outcome as comparisons of group means, they explicitly stated that forty-three subjects completed their entire fourteen-week treatment program although the information in their Table

2 revealed only six subjects in each of the two treatments for a total of twelve. None of these three studies comply with the criteria established in this paper.

Although these selected experimental studies are not comprehensive, they are representative of the current status of the behavioral approaches to overweight and obesity reviewed for this paper. Jeffery, Wing, and Stunkard (1978) stated that "The failure to find a relationship between changes in eating behavior and weight loss is puzzling..." (p. 197) If experimental studies using behavioral approaches to weight reduction and obesity have not established a data-based relationship between eating behavior change and weight reduction and/or obesity, it must be concluded that there are deficiencies in the experimental studies and/or there are additional factors contributing to the regulation of human body weight. Some of the deficiencies in the experimental studies were described in this section of the paper. The possibility that additional factors contribute to the regulation of human body weight will be investigated in Part III of this paper.

REGULATION OF HUMAN BODY WEIGHT

Part I of this paper distinguished between obesity (measured by skinfold calipers, and characterized by a long duration of both acquisition and remediation) and overweight (measured by a balance beam scale, and frequently amenable to fluctuation in relatively short time spans). These differentiations fail to define the specific factors regulating human body weight. Unless the specific factors regulating human body weight are identified, it is not possible to determine whether or not a successful intervention program can be established for either condition (obesity and/or overweight) using the methodological procedures according to the experimental analysis of behavior. This section will, therefore, attend to the specific factors which regulate human body weight.

The theoretical controversy over the possible differences in behavior between the obese and nonobese appears to be as diverse as the controversy over what constitutes effective treatment. Hagen (1976) strives for an integration of the major theories about and therapies for obesity. Wooley and Wooley (1975) stated that "We are a long way from understanding obesity, in large part because so little is known about the process of regulation of intake even in normal humans. Analogies drawn from animal research on food regulation and learning theory may provide a useful point of departure." (p. 116) In the review of articles for this paper, it has become increasingly evident that the basis for behavioral theories of and therapies for obesity and over-

weight are based on the results of animal research on food regulation and learning theory. The scientist must in turn ask if this analogy is valid.

Hypotheses about the regulation of human body weight and its modification are frequently extrapolated from empirical data from concentrated studies of the laboratory rat and mouse. According to Garrow (1975), the rat grew along a predictable curve when it had unlimited access to standard laboratory chow. When the rat is about three weeks old and weighs around twenty grams it is normally weaned. The rate of growth during the succeeding five weeks is very rapid, but then decreases in rate until maturity is complete. He cited similar growth curves for human infants from data accumulated by pediatricians. Average birthweight is about three and one-half kilograms with rapid increase in weight for the first year; subsequent weight gain is a flattened curve until the adolescent growth spurt occurs. Children of lower or higher than average birthweights also grow along the same weight curve pattern as the average birthweight infants. Bruch and Ross (1974) concurred with Garrow after their experiment with baboons. Jordon and Levitz (1975) noted that long-term stability of human body weight is regulated in the obese and normal weight individuals.

McCance (1962) reported experimental outcomes from underfeeding animals from birth to three weeks, and from nine to twelve weeks. From his observations he stated that "...From the work on rats carried out by ourselves and others it would appear that the younger the animal the more serious a nutritional setback will be, and permanent effects from undernutrition during foetal life are a distinct possibility." (p. 672)

Stunkard and Mahoney (1976) stated that "In distinction to the unequivocal role of learning in anorexia nervosa, obesity is a disorder of multiple origins, all of them poorly understood." (p. 49)

Experimentation With Animal Satiety Centers & Their Comparison to Human Eating Behaviors

According to Nisbett (1972) "There is considerable evidence, then, that the ventromedial rat is unresponsive to its nutritional state and highly responsive to the taste of its food. This same description also seems to apply to a variety of animals which are obese for natural reasons..." (p. 174) He then cited studies made on genetically obese yellow mice which support the above observation.

Schachter (1974) listed seven facts observed in VMH-lesioned animals: "1) The obese eat more good tasting food than do normals; 2) The obese eat less bad tasting food than do normals; 3) The obese eat on the average slightly, not hugely, more than normals do; 4) The obese eat fewer meals per day; 5) The obese eat more per meal than do normals; 6) The obese eat more rapidly; 7) The obese are less active than their normal counterparts." (p. 39) Schachter then extrapolated this information to the human obese subject. He added that: "8) The obese are more emotional than are normals; 9) The obese do better at active avoidance; 10) The obese do not regulate intake in accordance with the caloric density of a solid preload or diet. Normals do regulate; 11) Both the obese and normals do regulate intake in accordance with the caloric density of a liquid preload or diet; 12) When obtaining food requires no particular effort, the obese eat more than normals do; 13) When it requires work to get at food and the food cue is remote, the obese eat

less than normals do." (p. 39)

Nisbett (1972) stated that "To summarize the implications of the currently available data for the problem of causality in humans: The possibility that obesity produces altered cue responsiveness in humans is viable but a strong case for it cannot be made. The possibility that altered cue responsiveness in humans produces obesity is ruled out, at least for the human newborn who, since he does not eat until birth (except possibly amniotic fluid), has not yet affected his weight by his eating behavior. The noncausal possibility, that weight and cue responsiveness are merely correlated and not causally linked, is not supported by evidence, but it is also not contradicted by evidence." (p. 190) Nisbett and Storms (1974) reported that their information suggested that "...overweight individuals may be highly responsive only to external cues of a sensory nature and that the differences between the eating behavior of normal and obese individuals have their origin in biological processes rather than labelling processes." (p. 190)

One food regulation experiment by Wooley (1971) produced no differences between obese and nonobese subjects except for hunger ratings which increased progressively during the experiment. Wooley, Wooley, and Dunham (1972) found no differences between the subjective caloric ratings of obese and nonobese subjects. Schachter's external cue hypothesis was refuted by Wooley (1972), "...No differences were found between obese and nonobese subjects..." (p. 62) in an experiment designed to evaluate the regulation of food. Milich (1975-1976) found no support for Schachter's hypothesis of external cue sensitivity nor for Singh's response inhibition hypothesis.

Singh (1973), and Singh and Sikes (1974) reported experiments suggesting that the response habits or tendencies of obese humans are stronger than for the normal population, i.e., will work less, are more emotional, etc. Kimbrough (1976) found no differences in the accuracy of a food-related proof-reading task between obese and nonobese subjects. Falciglia (1977) found that obese subjects ate significantly more cookies than normal weight subjects during food commercials, but not during non-food related commercials. Meyer and Pudel (1972) suggested that overweight individuals may eat more slowly than nonobese subjects; while Mahoney (1975) and Gaul, Craighead and Mahoney (1975) observed that obese subjects eat faster than normal weight subjects.

Biological Factors Influencing the Regulation of Human Body Weight

Using empirical data from physiology, Reckless and Galton (1975) noted four factors which contribute to human obesity and the alteration of adipose tissue metabolism: (1) genetic factors, (2) hypothalamic damage, (3) primary metabolic effects re: lipolysis (the breaking down of fats into fatty acids and glycerin by the action of the lipases), and lipogenesis (the synthesis and storage of triglycerides in adipocytes or fat cells), and (4) hormone or endocrine imbalance.

These four factors were corroborated by Anthony and Kolthoff (1975). Genes determine the chemical configuration of the structural proteins of cells which determine the structure of the cell; and genes also determine the chemical structure of the enzymes, which are the functional proteins of the cells or those which determine the function of the cell, i.e., the kind of work it will perform. The chemical process of digestion is altered by excesses or deficits in any of the

enzymes and/or digestive juices normally occurring in the organs involved in the mechanical process of digestion. These enzymes and digestive juices chemically interact with all the ingested material (both liquid and solid) for assimilation into or evacuation/elimination out of the body. Mayer (1968), in his book Obesity: Causes, Cost, and Control, also cited genetic, metabolic, and endocrine factors in obesity and food regulation.

It stands to reason that if genes are the dictators of all cell formation and function, genetic heritage will certainly be a valid factor in the consideration of food regulation, weight, size, etc., for each human subject. While the ob/ob Bar Harbor mouse and the Zucker rat are genetically homogeneous, the humans that have been observed by Tondo, Lane, and Gill (1975) and others, cannot be identified or classified as homogeneous. This genetic distinction has not been explicitly stated in any of the reviewed literature, but it certainly seems to decrease the validity for the acceptance of the comparison of genetically heterogeneous human subjects to genetically homogeneous animal observations.

The role of the ventromedial hypothalamus as the satiety center of the brain is accepted by Mayer (1968) and by Anthony and Kolthoff (1975). It appears that the satiety center is inversely related to the feeding center, so that the suppression of one center activates the other center. If all of the factors in human obesity and the alteration of adipose tissue metabolism as cited by Reckless and Galton (1975) and others are valid, the manipulation of only one variable, i.e., surgical lesion of the ventromedial hypothalamus (VMH), is only one factor of the

integral process of food regulation and human body weight. The information from these observations is, therefore, only one component of the complex processes, and ergo it is an incomplete assessment of the total factors regulating the body weight of human and animal subjects.

The Effects of Social Control

An additional difference between laboratory animals and human subjects is the social environment which bears a strong influence on behavior patterns. The environment of laboratory animals may be legitimately manipulated, e.g., the kind of food, the amount of food, etc. The environment of human subjects is less amenable to manipulation - even for legitimate reasons. The good intentions of D.B. Jeffrey (1976), Foreyt, Scott, and Gotto (1976), Knotts (1976), McReynolds and Paulsen (1976) to modify the social environment and eating responses are commendable. However, observations of the social environment which would necessarily implement those modifications is full of control and counter-control. For example, D.B. Jeffrey (1976) suggested regulating the type and quantity of advertisements on children's television programs. Those advertisements help pay the salaries of the producers of the raw materials, the staff of the manufacturer, the cartage drivers, the store employees wherever they are sold, the advertising company staff, the television crew, etc. It would certainly seem that pressure to maintain those advertisements, i.e., jobs, would be greater than the likelihood that advertisements could be removed or significantly controlled. In addition, most children watch adult television shows, not only those for children, and the parents do the cooking and food purchasing for the most part. In order to effectively regulate food-

related advertisements the entire gamut of television advertising would have to be regulated. The possibility of this happening would not seem very likely.

Jordon and Levitz (1975) described the interaction between energy intake, energy expenditure, and the efficiency of the body's biochemical mechanisms (which cannot be directly or significantly altered at this time) as governing human body weight. They compared breast-feeding and bottle-feeding a newborn infant to demonstrate how the infant's behavior is influenced by parental teaching. They stated that

If one observes the eating behavior of a newborn infant, it is easily seen how parental teaching and attitudes begin to influence these behaviors. For example, the breast fed child sucks until satisfied and the mother does not know how much milk he has ingested. Physiologically, however, the mother produces milk according to the demands of the child. This important biological feedback system is completely disrupted when the breast is replaced by a bottle. Now the mother has a visual cue and can see how much milk the child has ingested. She can now use this cue to shape a child's eating behavior according to her own attitudes about how much the child should eat. It now becomes possible for her to over- or underfeed her child. Beginning with this process, the parent assumes a much greater role in teaching, shaping, and modeling feeding behavior.

In most instances, these learned behaviors result in the regulation of normal body weight. However, Ullman has outlined a number of ways by which a child may develop inappropriate eating habit patterns which lead to disorders in energy balance. First, the child may learn to depend on environmental cues for the termination of food intake. In the previous example of breast versus bottle feeding, the relationship between food delivery and the child's physiological needs is disrupted. As this occurs a child may be taught to rely on the cues provided by the parent rather than those provided by his own physiological needs. A common example of this process is when parental approval is given or withheld in association with the amount of food remaining on the child's plate. Through repetition of this process, the cue for meal termination is no longer an internal satiety signal but becomes the act of "cleaning the plate". In addition, food itself is a strong "positive reinforcer" as it satisfies physiological needs. Therefore, food may come to satisfy multiple emotional needs by being strongly and

repeatedly associated with parental attention, comfort and affection. Through this association, food may become a general way of coping with various emotional states. For instance, food can be used to reduce anxiety, alleviate pain, lift depression, relieve boredom, distract from loneliness, counter fatigue, or even enhance happiness.

Eating occurs in many situations and under a variety of conditions and experiences, and therefore ingestive behavior may come to be controlled by many influences other than those based on biological processes. Not only may parents actively teach inappropriate early eating behaviors and uses for food, but because the child patterns much of his behavior after that of his parents, the eating behaviors of the parent become incorporated into the repertoire of the child. It is through such behavioral developments as these that learning processes enter into the regulation of energy balance. (pp. 60 and 62)

This excerpt exemplifies some of the complex social behavioral patterns and physiological functions that determine eating behavior and energy balance in each individual human subject. The selection of foods and the patterns of eating behavior are thus regulated both internally (for the survival of the organism), and externally, by membership in a social environment along with the physical environment.

J. Mayer (1968) is one of the foremost authorities on nutrition; he stated unequivocally that "...In spite of the results of twenty years of concentrated research by this writer and others, all of which shows the extreme complexity and the multicausal etiology of obesity, persistent oversimplifications stressing that 'obesity is due to over-eating and all it takes is self-control to correct it' are, I believe, partly responsible for the exploitation of the public..." (p. 5)

It is not the intent of this thesis to malign any group sincerely concerned about the problems faced by obese subjects. However, it is only by factoring out those elements which together regulate human body weight that obesity may be logically and objectively examined in its totality. The fact of the matter is that the apparent brevity given

some of the studies in Part II is that eating and exercise are the only behaviors which regulate human body weight (both of which are greatly influenced by the social and physical environment). The other two factors which regulate human body weight along with the behaviors are in the realm of physiology and medical research. This conclusion dictates a reappraisal by the proponents of behavioral psychology and its role in the treatment of obesity and overweight. This area is addressed in Part IV of this paper.

CONCLUSIONS AND RECOMMENDATIONS

A synopsis of the preceding sections of this paper includes the following facts: 1) obesity and weight differ in modes of measurement and time for acquisition and remediation; 2) some reviewers of experimental studies termed behavioral approaches to obesity and weight reduction have identified and recommended certain intervention procedures as employed by various experimenters; 3) of the identified experimental studies, none complied totally to the methodological criteria in the experimental analysis of behavior; 4) the regulation of human body weight is contingent upon eating and exercise behaviors, but also upon genetic inheritance and body metabolism.

This paper is a pragmatic study of empirical data on the behavioral approaches to obesity and weight reduction. This is not to disclaim the pregnant ethical and legal aspects of the topic. However, those areas are not within the purview of this paper. Each researcher/clinical therapist must accept full responsibility for the consequences of the behavioral intervention procedures employed in this sensitive area of investigation. Nonetheless, it is incumbent upon the behavioral scientist to determine all of the factors or variables which regulate the behavior under investigation. Since obesity and weight are conditions (not to be labeled behaviors) which are not solely contingent upon behaviors alone, it is necessary to determine what courses of action are proper and logical for the behavioral therapist/researcher.

The following study exemplifies the sensitivity needed by any

behavioral researcher/clinical therapist in the treatment and study of obesity and weight reduction. An isolated report on self-control education with an obese female subject by Martin and Sachs (1973) serves as a poignant warning to all. The subject had received clearance from her physician to participate in the weight loss program. She lost fifteen pounds in four and one-half weeks, even though the therapists had specified that weight loss should not exceed two pounds per week. She celebrated her fifteen pound loss with alcohol, took a "mild depressant" for sleep, and ended up in the hospital with a "small observed change in her E.K.G." Without qualifications, the authors' remarkable conclusion was that "The present study seems to lend support to the efficacy of self-control programs of weight loss and control..." (p. 158) In view of the serious health ramifications, it is incredible that this conclusion can be so glibly postulated. To the contrary, this case study lends more credence to the complexity of human obesity/overweight as established in Part III.

This reviewer found three assumptions inherent in the Martin and Sachs (1973) report. One is that medicine is an exact science, and concomitantly, that some or all physicians are omniscient and highly principled in the practice of medicine. The third assumption is that all obesity/overweight must be remediated whatever the cost.

The assumption that medicine is an exact science as it pertains to the causes and effects of obesity is questionable. Stunkard and McLaren-Hume (1959) reported that a review of obesity treatments reported in medical literature from 1931 to 1958 by people with a particular interest in obesity demonstrated better results than those obtained

by the average physician, although they were also uniformly poor. The founder of Overeaters Anonymous, Christians (1978) stated that his experience had led him to believe that doctors were not able to cure his obesity or compulsive overeating because of their reliance on the medical model instead of behavioral and motivational variables. The second assumption, that some or all physicians are omniscient and highly principled in the practice of medicine is open to question. Friedman (1974), himself a physician, inserted portions of the 1973 hearings on Dr. Atkinson's diet by the Select Committee on Nutrition and Human Needs chaired by Senator George McGovern. These hearings described some of the potential dangers in certain diets, some of which have been publicized as "the diet" by errant members of the medical profession. On the treatment of obesity, Mayer (1968) stated that "...Only unmitigated quacks can pretend at present they they have a method of treatment which is at the same time safe and permanently effective for all..." (p. 166)

The third assumption, that all obesity/overweight must be remediated whatever the cost, was qualifiedly refuted by Friedman (1974). He stated that the evidence of a true relationship between obesity and increased mortality is controversial. He noted that obesity does not represent a serious health hazard for most people until it reaches a level of twenty-five percent or more above an individual's average weight. On the other hand, Mayer (1968) cited the social labeling of obesity as a moral issue associated with the "sin" of gluttony. In view of the multifarious origins and the exceeding complexity of obesity, this labeling appears to be simplistic, unfounded, and down-

right malicious. Skinner (1953) observed that human hunger is contingent upon the availability of food, but also upon the cultural (social) practices which instruct members what to eat, and when to eat or not, i.e., the schedules of deprivation and satiation. Therefore, the "sin" is one of the society in which the individual acts, reacts, and interacts. The burden of change is thus on the collective society, with individual involvement only as part of the integral whole. This dilemma is evinced in Skinner's Walden Two in which a separate society was established based on behavioral principles in order to change individual behavior(s). Each of the assumptions this reviewer finds inherent in the Martin and Sachs (1973) report is subject to doubt if not outright rejection upon the systematic examination of the totality of factors involved in obesity.

Under these assumptions it is worth noting that obesity may exacerbate some patients' medical problems, and that medical problems may be confluent with some patients' obesity. These observations gave impetus to the hue and cry against all obesity by some members of the medical profession. This deduction is unwarranted, and has produced a bias against and an exploitation of obese and overweight humans. That dominant members of a society, at a given point in time, dictate socially acceptable weight standards is apparent. The normative standards for weight during the sixteenth and seventeenth centuries as reflected in portraits by Rubens and other artists stand in stark contrast to the "Twiggy" look of the 1960's. The fact is obesity is not a problem until or unless it poses a behavioral problem for a particular client in behavior therapy, or a medical problem for a particular

patient under medical care.

The Complexity of Eating Behaviors

Some of the intricate and interacting elements involved in eating behavioral patterns will be briefly described. The complexity of exercise behavior(s) along with complex genetic factors, and complicated metabolic processes, in addition to the elements of eating behaviors should warn the reader of the sensitivity of the compound subjects of obesity and overweight. What may appear to be the simple measures of human body weight and density is fraught with social and physiological undertones.

Skinner (1974) stated that a person's behavior is controlled by his genetic and environmental histories and that human behavior is also a form of control. He stated that "A person acts upon the environment, and what he achieves is essential to his survival and the survival of the species..." (p. 208). It is abundantly manifest that air, food, and water are unconditioned positive reinforcers, i.e., they function to strengthen the behavior that precedes them without special training. Skinner (1974) also noted that food deprivation has been used to control people so that they will work for food. He stated that "...Food is reinforcing even when it does not satiate, and deprivation can be changed in ways that are not reinforcing. The relation between a state of deprivation and the strength of appropriate behavior is presumably due to survival value. If behavior leading to ingestion were strong at all times, a person would grossly overeat and use his energies inefficiently." (p. 55). Fowler, Fordyce, Boyd, and Masock (1972) astutely observed that "...Deprivation enhances reinforcers. The longer the

dieter deprives himself of food the greater the influence of food when he eats again..." (p. 99) Nowlis (1974) identified food as a drug since by scientific definition a drug is any substance which by its chemical nature effects the structure or function of the living organism. It appears that food addiction is a necessary part of the natural condition of man, or as Manno and Marston (1972) simply stated "...one must eat..." (p. 202) Since no behavioral researcher/clinical therapist has control over the genetic factors, and very little over the metabolic factors in the regulation of human body weight, it seems appropriate to examine the number and kind of practical controls available over eating behaviors of clients/subjects. This should facilitate identification of the logical course of action for the behavioral scientist.

Theory vs. Reality

It is the considered opinion of this reviewer that the foremost attribute of the experimental analysis of behavior is its inherent self-monitoring process. Unlike some psychological theories which rely on unperceivable phenomena with which to taxonomize and treat groups of people, the experimental analysis of behavior maintains control for individual reinforcement histories by observing and treating the behavior(s) of individual subjects or clients. Conjecture and chance or accident are proved or disproved by systematic and intense observation. These observations demonstrate the degree of control exerted by one factor or variable on other existing factors in a given situation across time. The empirical data may show excessive, deficient, optimal, or varying control under changing or stable conditions. When these data

become stable, an intervention procedure may then be employed for that particular behavior with that particular individual.

Unfortunately, the vast majority of articles reviewed for this paper did not comply with the experimental analysis of behavior. Therefore, the lack of sufficient empirical data on a large number of individual overweight or obese subjects precludes generalized statements about their eating and/or exercise behavior(s). Since most of the articles termed behavioral approaches to weight reduction and obesity treat subjects exhibiting these conditions by teaching subjects to change their eating behavior(s) (with equivocal results for the most part), it appears logical to examine some of the factors which appear to control human eating behavior patterns.

For lack of empirical data, one has access only to her/his observations of the prevailing social milieu. While these observations may change from observer to observer, it is based on each observer attending to the multitude of interacting stimuli in the surrounding environment, and an integration of those interacting stimuli. Some of the stimuli encountered during the composition of this paper appear eminently relative to behavioral approaches to weight reduction and obesity. Readers may determine that additional factors or stimuli are present in this society, however, these are the current impressions of this reviewer.

Environmental Observations

Controlling factors in human behavior are admittedly complex. Of necessity, food controls much of human responding as elaborated earlier in this paper. Behavioral scientists are thus dealing with control by a highly potent and singularly vital reinforcer. However, what one eats,

and how/when it is eaten is primarily learned from the social environment. It is logical, for the purpose of this paper, to ask what that environment has to tell us about the behavioral treatment of weight reduction and obesity. In general, this reviewer finds five interacting factors involved in the behavioral treatment of weight reduction and obesity. One factor is the level of intellectual functioning, or the individual capacity to assimilate and integrate information, and to comply or not comply with instructions from the total surrounding environment. Another factor is the socio-economic status of the financial resources available after necessary expenditures. Our society dictates that chronological age is a factor since children are not subject to the same set of contingencies as adults. The environmental settings of individuals is a factor since institutionalized individuals have a different set of contingencies than non-institutionalized individuals. Finally, the degree and kind of social or cultural control available to an individual in the form of parents, caretakers, spouses, co-workers, etc., is a factor.

The Level of Intellectual Functioning

Individuals in the natural environment demonstrate varying degrees of intellectual development and capacity. The educational procedures employed in many behavioral approaches to obesity and weight reduction rely upon a moderate level of intellectual functioning for success. This would seem to be the basis for the use of university students as the subject population in some of the intervention procedures. Due to the absence of supportive empirical data which would indicate success for these educational procedures, however, the relationship between IQ

and obesity/weight reduction is difficult to establish at present. An illustration of the issue of intellectual functioning appeared in a report by Hall, Hall, Borden, and Hanson (1975). They stated that "...After learning behavioral techniques, the client has a moderate repertory of effective behaviors to turn to if self-evaluation indicates his performance falls short of standard. However, if he has not learned these techniques, then increasing the probability of self-monitoring will not produce more effective self-control because the individual lacks effective controlling behaviors to call into play when his performance is below standard." (p. 171) The learning of behavioral techniques in all interventions requiring self-monitoring is dependent upon the individuals ability to read, write, and count, etc., at the time of self-evaluation. After compliance with procedural instructions, various instructional behaviors are sometimes performed in lieu of eating, and the client/subject must compare one situation to another so as to identify the most frequently successful alternative to eating. Without adequate client intellectual functioning, these tasks will be performed erroneously, partially, or not at all.

Some other articles reviewed for this paper briefly allude to the concepts of intellectual components in behavioral technology, and to the analogy between behavioral interventions and teaching by the therapist with learning by the client. Levitz (1973) called the behavioral treatment of obesity "...an educational approach..." (p. 23) Weisenberg and Fray (1974) described the relationship of the therapist and patient as one of teacher and student. Lindstrom (1975) found that the educational level of the subject was positively correlated with weight loss.

Mahoney and Mahoney (1976) noted the importance of cognitive variables. Stunkard and Mahoney (1976) reported that the most important variable in the treatment of anorexia nervosa appeared to be feedback information regarding weight and caloric intake. While there is no particular consensus of opinion about the specific level of intellectual functioning, there is evidence that it is an integral part of behavioral technology.

Observation of the general population reveals dissimilarity of intellectual functioning for whatever reason, e.g., cultural differences/deprivation, brain injury, genetically inherited defects, etc. Nowhere is this dissimilarity so evident as among institutionalized retarded populations. Polednak and Auliffe (1976) posited the occurrence of obesity among the retarded population as at least as great as is found in the general population. Casual observation of the retarded population reveals a deficit or variability of control in their intellectual functioning, over their behaviors, and over their environments. Control of this population in the natural environment, intermediate care facilities, or in institutions (and generally for children), is primarily in the hands of their caretakers, parents, and/or guardians. There are few experimental studies on obesity/weight reduction with the retarded population on which to report even though this population is most accessible to investigation. This paper will look at three different experimental studies of behavioral approaches to obesity/weight reduction with retarded subjects.

Foxx (1972) reported a successful single-case study with an institutionalized mentally retarded female. His procedure comprised thera-

pist reinforcement (ten minutes of conversation with the subject while imbibing a low-caloric drink) contingent upon weekly weight loss by the subject. The success of this single-case study and its cost efficiency in terms of therapist time and money, would seem to warrant its replication. Joachim and Korboot (1975) reported that self-monitoring by institutionalized retardates is insufficient for successful weight loss. They suggested that additional measures in the form of external or public monitoring and reinforcement be employed for improved success. Foreyt and Parks (1975) described an interesting composite program involving: retardates from a day care training facility; the parents with whom the retarded subjects resided (using an especially prepared manual); colored tokens which identified the kinds of food consumed by the subjects; and a fifty-cents per week reward for subjects who lost one pound or more of weight. In view of the increasing number of retardates living either at home, or in nursing homes and intermediate care facilities, it would appear propitious to replicate this study.

Another population with questionable control over their intellectual functioning, behaviors, and environment reside in psychiatric institutions. Five experimental studies reviewed for this paper occurred in psychiatric institutions, all of which employed a behavioral procedure involving token economies with secondary reinforcers. The author of a single-case study in a psychiatric institution, Bernard (1968), enumerated some of the problems of control in such an institution. These control problems included factors such as family and friends bringing in extra food and the "black market" within the confines of the institution. None of these problems were insurmountable in his report.

The fact is that institutional environments appear to be an ideal site for behavioral researchers to comply with all appropriate criteria for the experimental analysis of behavior re: eating and exercise behavior(s) and their effect on weight and obesity. This is true because a small number of obese subjects could be systematically and intensively studied for one to two years or longer. Each subject could be compared to her/himself, and later to others. The reversal paradigm could easily be implemented, and the environment could be controlled to a much greater degree, thus facilitating the observation of the majority of individual subject behaviors. An additional benefit would be the enhancement of the training of the caretakers of these populations. A sustained program of benign, systematic, and more effective control of this population could thus be ensured.

Socio-Economic Status

Some of the studies reviewed for this paper used financial contingency contracting as the primary intervention procedure while others used a contingency contract as a secondary procedure to ensure compliance with attendance requirements or with some specific instruction such as record-keeping. Any program which employs deposit contracts automatically eliminates generalizability across socio-economic strata. Members of the low income group in our society have little or no money to spend on the non-necessities of life such as obesity/weight reduction program costs. In the course of reviewing the experimental studies for this paper, it became evident that the effectiveness of financial contingency contracting for obesity and weight reduction is highly contingent upon at least four variables. First, the degree of the aversiveness associa-

ted with the obese or overweight condition for each subject/client is a factor in entering into a contract and compliance with instructions to lose inches and/or weight. Second, the amount of money involved in the contract and its relationship to the total amount of money available to the subject/client which is frequently either directly or indirectly related to the state of the total fluctuating economic system and the aversiveness of that contracted amount is a factor in compliance with instructions. Third, the immediate reinforcement afforded by the contract terms, i.e., reward for weight loss or punishment for gain or non-loss of weight. Fourth, the value of eating versus the value of the contractual reinforcement to each subject/client which is also influenced by socio-economic status. These four variables would appear to be the bases for the following comments by experimenters. Abrahms and Allen (1974) reported that situational management and pay-offs for weight loss were no more effective than behavioral management techniques. Rozensky and Bellack (1976) reported that the financial contingency in their program had either neutral or negative effects. Using financial contingency contracting, Vincent, Schiavo, and Nathan (1976) obtained treatment outcomes which exhibited great variability in both weight loss and body density.

Unequivocal empirical data are necessary to lend support to the contentions of the proponents of financial contingency contracting. Variable responding and equivocal results from experimental studies of financial contingency contracting contradict its efficiency as a behavioral technique for obesity and weight reduction - even for those who can afford this program. It appears paradoxical to this reviewer

that a punishment technique such as financial contingency contracting would be used on a population already punished by the majority of the society of which they are members. At any rate, it is assumed that this cursory account will aid the reader in becoming more aware that there are effects resulting from socio-economic status on many things, but especially for this analysis, on eating and obesity/weight reduction programs of any kind, indeed, on eating certain kinds of food instead of others.

Environmental Settings

The psychological, physical, and intellectual functioning levels of individuals are frequent determinants of their environmental settings. The issue of institutionalized subjects/clients was partially addressed in the section on the levels of intellectual functioning. The majority of individuals function in the natural environment, e.g., home, work, school, etc. Behavioral scientists' control over the natural environment of non-institutionalized clients or subjects is almost nil. The minimal amount of control which clinical therapists and researchers have over the return of a client or subject for treatment or investigation is the reinforcement delivered by the therapist or researcher, and the degree of success in assuaging the problem (as perceived by the client/subject) which is being treated via the expertise of the clinical therapist/researcher. These interdependent variables, therapist/researcher reinforcement and expertise, affect targeted behaviors of the client/subject which theoretically produce a decreased amount and/or kind of one or more aversive events, which brings the client/subject back to the therapist/researcher until the

reinforcement from the natural environment is sufficient to maintain the new behavior(s). This complete set of contingencies is absent from self-help manuals which accounts for their low success rate. These contingencies also dictate the mutual selection of behaviors to be modified and intervention procedures to be employed by both therapist/researcher and client/subject. If the objective(s) of the client/subject are not congruous with the objective(s) of the therapist/researcher, one or more of the contingencies will not be fulfilled because of the discrepancy between the targeted behavior(s). Stuart (1967) stated that "Man clearly controls his own behavior so as to achieve his own objectives..." (p. 357) - not necessarily those of another. Davison (1973) pointed out "...consider how much cooperation from the client is necessary for most of the procedures available to us..." (p. 154) Domke (1975) stated that "...it is recommended that future research focus on how to motivate the overweight person..." (p. 5253-B) It is fact that there is nothing which can force a client/subject to comply with therapist/researcher instructions in the natural environment.

Examples of various controlling factors involved in behavioral approaches to obesity and weight reduction appear in some of the articles reviewed for this paper. Kennedy and Foreyt (1968) stated that "Only where there is complete control over S's environment can such questions (re: the veracity of self-reports) be adequately answered." (p. 575) Sachs and Ingram (1972) reported that "...it is possible that any differences (between groups) were masked by the powerful effects of S's set and expectations..." (p. 973) Bellack, Schwartz, and Rosensky

(1974) stated that "...there does appear to be increased chance of success when some external control is included, although the function of that control is uncertain..." (p. 245) Bellack (1976) stated that "Two major difficulties with research on self-control are the identification of procedures that are powerful enough to be effective in the absence of external control, and the collection of data on how consistently the procedures are applied..." (p. 73) Carter, Rice, and De Julio (1977) recommended that the therapist be faded out of therapy so that self-control may supercede therapist control. Thus, the complex issue of the natural environmental setting is another factor which must be assessed by the behavioral scientist.

Social/Cultural Control

Of all the variables controlling human behavior the social or cultural control on societal members is probably the most potent and complicated of all. It is not possible, therefore, to elaborate on the many facets of social/cultural control within the confines of this paper. However, it is incumbent upon behavioral scientists to keep in mind the prevailing societal bias against obesity and the obese as it is currently promoted by some members of the medical profession. This aspect of social control provides generalized aversive consequence for the obese or overweight members. The socially punitive results of the condition of obesity/overweight should further caution the behavioral scientist, especially when intervention procedures contain aversive features.

The paradox of treating a punitive condition by aversive intervention procedures is possibly the basis for the ambiguous results

found in most of the experimental studies using aversive techniques for obesity/weight reduction reviewed for this paper. In point of fact, the only successful use of aversive techniques was in the treatment of compulsive eating behavior without weight or obesity as the dependent variable. The experimental study by Wijesinghe (1973) conformed to the experimental analysis of behavior for the most part. Although no baseline data are presented, each of two female subjects reported compulsive eating of particular foods. Each subject supplied the one food item which was then paired with electric shock. Both subjects reported successful extinction of the compulsive eating behavior. The author noted that one subject appeared obese while the other did not, but at no time did he mention weighing them, nor did he use weight as the dependent variable.

One of the major consequences of punishment is variable responding. It would seem that this would be one reason physicians rarely prescribe extremely stringent diets for their patients. If a diet is too drastic, the patient's compliance would vary. Observations of the behavior(s) exhibited by subjects experiencing punishment from the natural environment would appear heuristic; one example is subjects with food allergies. Ethical and practical considerations preclude the imposition of punishment techniques on unsuspecting clients/subjects. There are many punitive events in every day existence which are observable and potentially informative. Until more knowledge is accumulated on the effects of punishment, it is urgent that more efficacious procedures be employed by behavioral scientists.

There are two successful case studies reviewed for this paper that

illustrate the efficiency of adroitly managed social control. Dinoff, Ricard, and Colwick (1972) employed specific rewards, in the form of specific events (as identified by the subject) contingent upon the subject's performance of criteria which were modified as the program progressed. Baird and Redfering (1975) utilized contingent behaviors of a husband and wife in order to change specific behavioral responses by each other. Rimm and Masters (1974) supported the use of contingency management. There are two reasons for the use of contingency management as an intervention procedure with a client in the natural environment. One, family and/or friends spend more time than the therapist spends with the client. Two, family and/or friends, presumably know what rewards and punishments are the most potent for one another. This intervention procedure is more costly in terms of therapist time and energy, but if a client/subject is in the natural environment it provides more efficient control over her/his behavior(s).

These five factors: the level of intellectual functioning, socioeconomic status, age, environment, and social/cultural control interact with one another and with the regulation of individual human body weight. The result of this interaction compounds the already complex issue of the regulation of human body weight, the physiology of which is little understood. Paradoxically, many in the medical profession, in whose members is vested society's physical well-being, are condemning the condition of obesity/overweight without substantial proof that it is dangerous to health for all individuals, and without complete knowledge of the etiology of the condition of obesity/overweight.

Summation

The fact that the regulation of human body weight is contingent upon four factors: metabolic processes and genetic inheritance; and exercise and eating behaviors which are consequences of the level of intellectual functioning, socio-economic status, age, environments, and social membership demands a non-simplistic consideration of the condition of obesity/overweight. It is incumbent upon each behavioral scientist to maintain sensitivity to each factor upon which human body weight is dependent. This sensitivity is manifested in the physicians' advice and consent required for subjects/clients to participate in behavioral programs for obesity/weight reduction. The initial burden for sensitivity to obesity/overweight is, therefore, upon the medical profession. The logic for this position is substantiated by the five types of human obesity taxonomized by Mayer (1968): genetic origins, hypothalamic origins, central nervous system origins, endocrine origins, and immobilization or social/cultural origins. The vast majority of the responsibility for research in the investigation and remediation of obesity/overweight is obviously on physiology and medicine.

In the meantime behavioral researchers have an abundant source of information available in various institutionalized populations. Relying upon the methodology mandated by the experimental analysis of behavior, empirical data can be accumulated on eating and exercise behaviors. This empirical data may illuminate the cumulative affect of these behaviors on the conditions of obesity/overweight. The integrity of the experimental analysis of behavior would remain intact, and continue to be the basis for behavioral technology. The information con-

tained in this paper is antithetical in advocating behavioral approaches to obesity/weight reduction at this point in time. The generally accepted function of the behavioral clinical therapist is to supervise and assist in the remediation of targeted behaviors as presented by the client. The goal of this remediation is to provide the client with improved control over her/his environment. On the other hand, if an obesity/weight reduction program becomes the function or task of the behavioral clinical therapist, the target is to bring client behavior into compliance with the dictates of the program. In other words, program control over client behaviors is the goal of this function. These two goals are mutually exclusive, and it is doubtful that a therapist can successfully achieve rapprochement between them.

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